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DISCUSSION

Q: What size of ewe flock does Professor Rae consider would be required to demonstrate the effectiveness of a breeding system in increasing lambing percentage?

PROFESSOR A. L. RAE: To demonstrate the effectiveness or otherwise of a selection plan, one would need to have a flock selected according to the plan under test and a "control" flock against which the progress in the selected flock is measured. The latter could be a randomly selected flock or a flock in which selection is carried out by some other method or in the opposite direction. As both ewe and ram replacements are selected from within each flock, an important consideration in deciding on numbers is the rate of increase of inbreeding. The greater the number of sires used, the slower is the rate at which the level of inbreeding increases and, consequently, the smaller is the possible effect of inbreeding in countering changes due to selection. A minimum number of five sires would give a reasonably slow rate of increase of inbreeding for a short-term selection experiment.

It is also desirable that the selected flock be replicated in order to obtain some assessment of the variability of the selection response.

Q: Would Professor Rae comment on the improvement possible in the Romney breed working within the closed, New Zealand population, and whether greater improvement might be possible by cross-breeding?

PROFESSOR RAE: There is no evidence available to suggest what the limits to improvement are in the Romney breed. Immediate gains in lamb production in the first cross of breeds such as the Cheviot and Border Leicester with the Romney, are of the order of 20 to 30% in lambing percentage. However, there is still insufficient information to answer the question as to how much of this increase is lost when the first-cross sheep are interbred and to what extent any loss may be compensated by selection among the interbred sheep.

On present evidence, it would appear likely that it would take between 10 and 20 years to achieve a gain of 20 to 30% in lambing percentage by selection within the breed.

Q: Does Professor Rae not consider that progeny testing of rams, with particular respect to fertility and growth of lambs, would be the best method of obtaining genetic improvement?

PROFESSOR RAE: The major disadvantage of progeny testing of rams for fertility is the lengthening of the generation interval. This occurs because it is necessary for the daughters of the ram to have had the opportunity to lamb before the progeny test information becomes available. If progeny testing were allied with the use of artificial insemination, however, it is possible that the increased accuracy and intensity of selection could compensate for the increased generation interval.

Q: Would greater efficiency of selection not be achieved by the use of a selection index, weighted for the various productive components—fleece weight, growth rate, etc.—rather than the use of simple ratios? Such an index might also be used for the selection of A.B. bulls, and could include some weighting for fertility.

PROFESSOR RAE: In my paper, consideration was given to the ratio fleece weight/body weight only, as a measure suggested for assessing efficiency of wool production. A complete analysis of productive efficiency would be more satisfactorily carried out by use of the selection index approach.

Q: Are the blood sodium/potassium ratio differences found by Evans being used in animal breeding, and are they considered to have any great merit?

PROFESSOR RAE: To the best of my knowledge, information on the blood sodium/potassium ratios is not being used in animal breeding, nor does there seem to be sufficient published evidence yet on their relationship to productive characters in animals.

Q: Dr Cockrem's Figure 2 suggests that rectal temperatures fell steadily until October, and then sharply after shearing. Is this so?

DR F. COCKREM: Rectal temperatures declined over the whole period relative to ambient temperature, with a low point in October. This low point coincided with shearing, but the experiment was not designed to test specifically the effects of shearing.

Q: Does Dr Cockrem attribute the change of rectal temperature with time, which occurred in woolly-faced sheep, to a stress factor after shearing? Did Dr Cockrem measure respiration rate and heart rate on the open and woolly-faced sheep and did such measurements suggest a stress situation?

DR COCKREM: The important point to illustrate this paper is that sheep can show a differential response in rectal temperature. In this particular case, woolly-faced sheep showed the greater drop after a stress situation, namely shearing. The conclusion is that this is a situation worth investigating. The relationship between stress and face cover is still a hypothesis without direct test.

Q: Is there any provision made in the Dairy Board's A.B. Scheme for the proportionally greater use of semen from the best proven bulls than from the less good, but still proven bulls?

DR S. R. SEARLE: There is no such provision in the bull-sampling programmes as discussed, but it is allowed for in the actual operation of A.B. Conscious effort is made towards greater utilization of semen from the proven bulls with highest ratings than from those with the lowest ratings, which are held in reserve and used only when required.

Q: Is there no way of improving the initial selection of bulls to be proven by, say, breeding the best bulls to selected cows?

DR SEARLE: Some account is taken of this by notifying farmers at the start of each breeding season that sons of certain bulls will subsequently be sought for the A.B. Scheme, if their dams are of sufficiently high quality, care being taken to see that no excessive use is made of the sons of any particular bull. This procedure is likely to produce results equivalent to those of a selected mating scheme.

Q: There is evidence that fertility of bulls is to some degree inherited. Is any account taken of this in the selection of A.B. bulls?

DR SEARLE: The bull-sampling programmes discussed take no account of the inheritance of fertility. Bulls with low conception rate are not used in A.B. once this fact has been established, and their sons are unlikely to be selected for A.B. Furthermore, the preference for bulls of high conception rate, under the nominated service available with frozen semen, results in a high proportion of sons of these bulls being offered for use in A.B.

Q: Since there is a genetic correlation between butterfat and protein in milk, why do the Dutch not rely on improving protein yield through raising butterfat yield, since analysis for butterfat is much simpler than for protein? What is the attitude of British geneticists to increasing protein yield?

J. W. STICHBURY: If the aim is to increase protein yield or protein percentage then faster progress can be made by direct selection for these characters rather than by relying on the genetic correlation between butterfat percentage and protein percentage.

However, where raising protein percentage is not a major aim, then the view of most geneticists appears to be that sufficient progress can be made by relying on the correlation between butterfat and protein percentages.

DR A. STEWART: Protein testing was originally introduced in Holland to assist in the equitable payment for milk for cheese-making in Friesland, and has spread to other herds throughout Holland, since it is considered to provide good advertising material when selling stock. Improvement in protein yield would certainly be relatively slow if reliance was placed on its positive association with butterfat yield.

Q: What are the possibilities of using milk testing records collected by herd owners for progeny test purposes in artificial breeding?

MR STICHBURY: This is under consideration in England, and when a suitable milk meter is available I consider that we should also use such records in this country.

Q: What has become of the traditional role of private pedigree breeders in countries where A.B. plays an important part in the dairy industry?

MR STICHBURY: In countries where the majority of the dairy cows are mated by this means the pedigree breeder has become an integral part of the A.B. Scheme, and his traditional role as a breeder of young bulls to be used *via* natural mating has largely disappeared.

In other countries the breeder is finding an increasing demand from A.B. organizations for young bulls but the total number of bulls he can sell is declining. As a consequence there is some friction between breeders and A.B. organizations in these countries,

Q: Are there any significant developments overseas in semen deep-freeze techniques which might be of value in New Zealand?

MR STICHBURY: I did not observe any techniques in operation which are markedly different from the procedure here. However, at the experimental level, there appear to be some promising diluents, and there is evidence that freezing with liquid nitrogen is superior to dry ice in maintaining a satisfactory conception rate.

Q: Would Mr Stichbury comment on the advantages of the decentralization of A.B. centres—as in England and Wales, where there are 29—compared with New Zealand where until recently we had only a single A.B. Centre covering the whole country.

MR STICHBURY: The major advantages of a large number of centres are the relative ease of getting semen to the inseminator with a minimum of delay, and as an insurance against the effects of disease outbreaks, such as foot-and-mouth disease. On the other hand, the coverage obtained per bull seems to be reduced when the breeding unit is small and consequently there is less scope for selection of proven bulls.

Q: What is the extent of the use of specialized beef breeds in dairy herds in the countries visited by Mr Stichbury?

MR STICHBURY: They are used to a considerable extent in the United States and England. In Continental Europe the breeds used are dual-purpose and there is little demand for the use of specialized beef breeds.

The only exception to this appears to be in Denmark where the Jersey breed society is carrying out trials with the Charollais-Jersey cross in an endeavour to provide a better beef animal from the Jersey cow and thus enhance the popularity of the breed among farmers.